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(Abridged Translation)

Rejection of the Application

Dispatch Date
September 30, 2003

Application Number: 2000-537271
Date of the rejection: September 17, 2003
Name of Examiner: Masako IMAZEKI 9529 2V00
Attorney for Applicant: Yoshihiro CHIBA
(with the other attorney)
Applied Provisions: Sections 29(2) and 36

This application should be rejected for the reason below.
If the applicant has any argument against the reason, such argument should be submitted within 3 months of the date on which this notification was dispatched.

Reasons:

<Reason 1>

The recitation in claims of the present application does not meet the requirement of Section 36(4) and 36(6)(ii) of the Japanese Patent Law as mentioned below.

Details:

A. Regarding the structure of a light-emissive layer, the Japanese terminology "a mixture" in claim 1 does not cover a layered structure of respective components or a structure having components which are chemically bonded. The term "phase-separated" is also unclear. It seems that the term "phase" does not mean the three-phase of the substance (solid, liquid and gas).

In the Argument submitted dated June 24, 2003, the applicant argued that in the light-emissive layer there may be varying concentrations of the three components in the light-emissive layer. In this sense, it is approvable that the layer comprises a mixture. However, in another sense, that is, the definitions of a mixture in the light-emissive layer are not generally approved, which are shown in the argument against the 4th reason of the rejection or the argument against the 17th reason of the rejection in the submitted Argument.

Accordingly, there is technological inconsistence among claims 2, 9-13, and so on. Dependent claims of these claims

are also inconsistent. For example, in claims 14 and 2, it does not make sense that three components are phase-separated while the light-emissive layer is formed by deposition of three components concurrently.

B. In claims 4 and 7, as to the phrase "the...component has a greater affinity", the applicant explained that affinity is defined as a physical force to draw or attract a substance. Regardless of the definition, it is unclear what kind of material has a greater "physical force to draw or attract a substance" than the second component has. Thus, the invention is not clearly understandable.

C. In claims 35 and 53, the definition of "a luminescent type II interface" is unclear. Though in the paragraph [0020] (*Note: the paragraph from line 21 in page 7 of the English specification) it says: "type II interfaces which do not lead to charge separation", its technical meaning is unclear.

D. In claims 56 and 60, the step of "treating ... to influence the phase structure of the light-emissive layer" is too vague to define the scope of the invention clearly. It is not possible to clearly limit the scope of the invention, about a feature which is not described in the specification.

As the applicant argued in the argument against the 15th reason of the rejection, the specification recites one example. However, the recitation of claims 56 and 60 is too generic.

E. In claims 57 and 61, the phrase "the step for treating...to increase the concentration of the first component" is still too vague as a step of forming method. It is not possible to clearly limit the scope of the invention, about a feature which is not described in the specification.

F. In claim 36, there are recitations as to "a first organic light-emissive component for accepting and combining...negative charge carriers from the second light-emissive component to generate light" and "a second organic

light-emissive component for accepting and combining...positive charge carriers from the first light-emissive component to generate light". However, it is unclear what relationship between the first and second organic light-emissive components allows each component to give and receive the carriers, even if detailed explanation in the specification is considered. Thus, it is not possible to specify an electroluminescent device in claim 36.

As mentioned above, the invention regarding claims 2-61 is unclear.

G. Besides the meaning of the "mixture" mentioned in the above item A, it is still unclear how the invention in claims 2-61 is implemented.

H. None of specific compounds nor how to obtain them as the material in claims 11-12, 43 are described.

Therefore, the description in the specification is not clear and sufficient enough for a person skilled in the art to implement the invention in claims 2-61.

<Reason 2>

The inventions defined in the claims mentioned below of the present application could easily have been made, prior to the filing of the present application, by a person skilled in the art to which the inventions pertain, on the basis of inventions which were described in the following publications distributed in Japan or elsewhere, therefore, a patent shall not be granted for the inventions under the provision of Section 29(2) of the Japanese Patent Law.

Details:

Cited references:

Reference 1:

Japanese Laid-Open Patent Publication No. 4-212286

Reference 2:

Japanese Laid-Open Patent Publication No. 7-85972 -57-
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Reference 3:
Japanese Laid-Open Patent Publication No. 8-319482

Reference 4:
Japanese Laid-Open Patent Publication No. 3-114197

Reference 5:
Japanese Laid-Open Patent Publication No. 4-357694

Reference 6:
PCT International Publication WO96/20253

Reference 7:
Japanese Laid-Open Patent Publication No. 8-41452

Reference 8:
Japanese Laid-Open Patent Publication No. 4-334894

Reference 9:
Japanese Laid-Open Patent Publication No. 2-261889

Reference 10:
Japanese Laid-Open Patent Publication No. 3-230584

Reference 11:
Japanese Laid-Open Patent Publication No. 7-85972

Reference 12:
US Patent No. 5886464 (class 313/503)

CLAIMS 1-15, 17-37, 40-41, 44-55 AND 58-59:

The references 1-12 are cited. Claims 16 and 42 involve an inventive step.

The cited references (1-3) and 8, for example, disclose an electroluminescent device comprises a light-emissive layer located between an anode and a cathode, and the light-emissive layer comprises: a hole transport material (a first component for accepting positive charge carriers); an electron transport material (a second component for accepting negative charge carriers); and a light-emissive material (a third, organic light-emissive component for generating light as a result of combination of charge carriers from the first and second components). Thus, such electroluminescent device is deemed as well known art. Especially see the reference 2, paragraphs [0035]-[0058] and the first embodiment; and the reference 3, claim 5 (*Note: Claim 5 of the reference 3 corresponds to Claim 5 of US Patent No. 5756224).

Also, at least one pair of the three materials form type II semiconductor interface. See the reference 1, paragraph [0064]; and the figures in the reference 2.

Claim 2:

If the term "phase-separated" means a structure having

some separate layers, a multi-layered electroluminescent device in which some functions are separated in each layer is well known. See the reference 3, claims 1-4.

Claim 3:

Forming a hole transport layer between the light emissive layer and the anode is disclosed in the reference 1, paragraph [0072] and the eleventh embodiment; and the fifth embodiment in the reference 2.

Further, as disclosed in the references 4 and 5, a mixture layer having a concentration gradient between adjacent layers is well known in the technical field of an electroluminescent device. Thus, it is easy for the person skilled in the art to make the concentration of the first component increase towards the first charge carrier injecting layer, by applying the known art in the references 4 and 5 to the known art in the references 1-3.

Claim 4:

It is well known for a skilled person that the higher the adhesiveness between an inserted layer and the light-emissive layer and between the inserted layer and the anode is, the more preferable it is. It is well known for a skilled person to choose a component having a greater affinity.

Claim 5:

The hole transport layer or electron blocking layer inserted between the light-emissive layer and the anode corresponds to a layer comprising the first component shown in the present claim 5.

Claims 6-8:

The electron transport layer or hole blocking layer between the light-emissive layer and the cathode corresponds to a layer shown in the present claims, for the same reason mentioned as to the claims 3-5.

Claims 9-13:

The invention in these claims would be easily made if a skilled person applied the materials for an organic electroluminescent device disclosed in the references 6 and 7 to several materials in the references 1-3. Also, the invention would be easily made if a skilled person applied the materials disclosed in the references 6 and 7 to a hole transport light-emissive material and an electron transport light-emissive material in the reference 8.

Claim 14:

The method of making a light emissive layer is disclosed in the reference 1, paragraph [0067].

Claim 15:

See the above item as to claim 2.

Claims 17-25:

It is a matter of design choice for a skilled person to decide an optical gap or specific compound of each component.

Claims 26-35:

The features recited in these claims are well known for a skilled person, considering the principle of light emission in an electroluminescent device or the like.

Claim 36:

The first organic dye and the second organic dye in the reference 9 are though to correspond to a first organic light-emissive component and a second organic light-emissive component in the present claim, respectively.

Since the reference 9 further discloses that both of the first and second light-emissive components emit light in a single layer, it is admitted that each light-emissive component would give or accept charge carriers.

Also, the embodiment of the reference 9 recites some components (first organic dye: anthracene, and second organic dye: perylene, tetracene, and pentacene). In view of these compounds, it is admitted that the light-emissive components

would form a type II semiconductor interface with each other. The energy level is a physical property unique to each compound. The relative relationships are shown in Fig. 3 of Japanese Laid-Open Patent Publication No. 2000-252077.

Claims 37, 40-41, 44:

The reference 10 discloses a light emissive layer of two-layer structure having a type II semiconductor interface.

Claims 38-39, 43:

Specific compounds are unclear.

Claims 44-52:

The features about an organic electroluminescent device recited in these claims are well known to a skilled person.

Claims 53-55:

In view of, especially the figures of, the references 10-12, it is admitted that a heterojunction formed between the organic charge transport layer and the organic light-emissive layer would be a luminescent type II heterojunction.

The reference 11 discloses an electron injection molecule, a hole injection molecule, and a light emission site, which would correspond to each of first to third components in claim 54. It is easy for a skilled person to deposit these three components concurrently. See the reference 11, paragraphs [0024]-[0030] for the description of the light emission site.

Claims 58-59:

See the above item as to claim 36.

Accordingly, the invention recited in claims 1-15, 17-37, 40-41, 44-55, and 58-59 is easily made by a skilled person in view of the cited references 1-11.

For the claim(s) other than the claim(s) specified in this notification of rejection, no reason(s) for rejection has been found so far. If any reason(s) for rejection is found

later, it will be notified.